RESPONSE AND REQUEST FOR RECONSIDERATION

The present invention relates to lubrication of a sump-lubricated, compression ignited (that is, diesel) engine. The lubricant contains a substantially nitrogen-free sulfurized olefin antiwear agent and about 1 to about 10% of a nitrogen-containing dispersant. It is a low phosphorus, low sulfur, relatively low ash composition, as specified in claim 1.

The Examiner indicated that claim 1 and most of the dependent claims were made obvious by the teachings of Nakazato et al., JP 2002-053888 (available as a machine translation). Applicants respectfully traverse.

The present claims are not made *prima facie* obvious by the Japanese reference. The sulfurized olefin is disclosed therein as only one of many optional types of materials, in paragraph 0039. In order for the skilled person to select sulfurized olefin and use in the present invention, one would need to (1) select the presence, rather than the absence, of one or more of the auxiliary agents that are listed as optional; (2) select an antioxidant or antiwear agent, from among other types of optional additives (metal deactivators, surface-active agents, friction modifiers, antifoam agents, pour point depressants); (3) select a "sulfur-systems compound" from among other types of antioxidant/antiwear agents (zinc dithiocarbamate, methylenebis(dibutyldithio-carbamate), oil-soluble copper compounds, phosphoric ester, phosphite, and organic amide compounds); and (4) select a sulfurized olefin from among the "sulfur-system compounds."

However, any case of *prima facie* obviousness that may exist is overcome by the comparative data presented herewith, in the declaration of Ms. Virginia Carrick. Ms. Carrick prepared a series of lubricant formulations, each containing a succinimide dispersant and 0.3 or 0.5% of a variety of antioxidant/antiwear agents of the types disclosed in the reference. Other conventional lubricant additives were also present, in conventional amounts. The materials tested included oleylamide (comparative – see paragraph 0039 of the reference, 9th line of the translation), an amine phosphate salt (comparative – see paragraph 0039, 7th line, "phosphoric ester"), dialkyl polysulfide (inventive -- sulfurized isobutylene), and a sulfurized olefin ester (inventive -- sulfurized 4-carbobutoxy cyclohexene).

All four formulations were subjected to wear and oxidation tests, as described in greater detail in the Declaration. The results are summarized in the table below:

Example:	1*	2*	3	4	5*	6*	7	8
(a) Oleyl amide, %	0.3				0.5			
(b) Amine phosphate salt		0.3				0.5		
(c) Dialkyl polysulfide, %			**0.3**				**0.5**	
(d) S'd carbobutoxy cyclohexene, %				**0.3**				**0.5**
Test Results								
HFRR wear scar, μm	181	184	**162**	**157**	243	192	**182**	**142**
OXDN 200C								
% viscosity increase	60.8	78.5	**53.1**	**51.2**	75.1	85.5	**49.1**	**41.6**
PDSC, OIT (min)	64.2	60.3	61.3	**75.5**	61.9	56.6	58.6	**73.3**

* comparative

In the wear test, both formulations containing the sulfurized olefins exhibited significantly improved antiwear performance compared to the comparative formulations, at both concentration levels (note: reduced wear scar is better). In the OXDN 200C test (measuring increase in lubricant viscosity) both formulations containing the sulfurized olefins exhibited significantly improved performance compared to the comparative formulations, at both concentration levels (reduced % increase is better). In the PDSC oxidation text, based on pressurized differential scanning calorimery, the dialkyl polysulfide did not show significant improvement, but the sulfurized carbobutoxycyclohexene did show a significant improvement over the comparative formulations, at both concentration levels. (It is believed that the test measuring actual increase in lubricant viscosity under oxidizing conditions is a more direct measurement of oxidative stability than is the calorimetry test.)

There is nothing in the teachings of the Japanese reference that would lead one to select the sulfurized olefins, as required by the present invention, nor to expect that they would provide significantly better oxidation and wear performance than any of the other optional components suggested by the reference. Accordingly, it is submitted that the present claims are unobvious.

Additional references were cited in combination with the main Japanese reference, against certain of the dependent claims. Claims 6, 7, 12, 21, and 22 were rejected over the JP reference, further in view of Gatto (US 5,840,672). These claims specify certain specific types of sulfurized olefins, types of detergents, or amounts of

the sulfurized olefins. Gatto is said to disclose certain types of sulfurized olefins. Claim 8 was rejected over the JP reference, further in view of Boffa et al. (US 5,804,543). Claim 8 specifies an amount of zinc dialkyldithiophosphate. Boffa is said to disclose low levels of ZDDP. Claim 20 was rejected over the JP reference, further in view of Igarashi et al (US 5,912,212). Claim 20 specifies a type of hindered phenolic ester antioxidant, which is said to be disclosed in Igarashi.

However, none of these secondary references supply the teachings missing from the Japanese reference, namely, the selection of a sulfurized olefin in combination with a lubricant composition having the present specifications. Neither is there any disclosure or suggestion that making this selection would lead to the improvements in wear and antioxidation performance that have been demonstrated in the Declaration of Ms. Carrick. Accordingly, each of the dependent claims, being narrower than claim 1, are likewise unobvious for the same reasons as is claim 1.

Conclusion.

For the foregoing reasons it is submitted that the present claims are unobvious and in condition for allowance. The foregoing remarks are believed to be a full and complete response to the outstanding office action. Therefore an early and favorable reconsideration is respectfully requested. If the Examiner believes that only minor issues remain to be resolved, a telephone call to the Undersigned is suggested.

Any required fees or any deficiency or overpayment in fees should be charged or credited to deposit account 12-2275 (The Lubrizol Corporation).

Respectfully submitted,

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